PORSF
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03/04/2005 DRAFT

NORTHWEST PIPE COMPANY
CSM Site Summary

NORTHWEST PIPE COMPANY

Oregon DEQ ECSI #: 138

12005 N. Burgard St.
DEQ Site Mgr: Alicia Voss
Latitude: 45.6111°
Longitude: -122.7691°
Township/Range/Section: 2N/1W/35

River Mile: 4 East bank

LWG Member ☐ Yes ☒ No

Upland Analytical Data Status: ☐ Electronic Data Available ☒ Hardcopies only

1. SUMMARY OF POTENTIAL CONTAMINANT TRANSPORT PATHWAYS TO THE RIVER

The current understanding of the transport mechanism of contaminants from the uplands portions of the Northwest Pipe site to the river is summarized in this section and Table 1, and supported in the following sections.

1.1. Overland Transport

This site is not located on the waterfront; therefore, overland transport is not considered a pathway for contaminants from this area to reach the river. Approximately 84% of the total area of the site is covered by impervious surfaces (CH2M HILL 2000).

1.2. Riverbank Erosion

This site is not adjacent to the river.

1.3. Groundwater

Two chlorinated solvent shallow groundwater plumes (up to 10 mg/L) have been recently (2000) discovered beneath the site. Both plumes appear to flow offsite to the southeast and southwest. The sources of these plumes have not been determined. TPH has been detected in groundwater; however, TPH testing has not been consistent, and trends in concentration and distribution have not been evaluated. Although the shallow water-bearing zone has a shallow gradient with variations in flow direction across the site, the shallow groundwater flow is generally toward the Willamette River and is a potential transport pathway. Chlorinated solvents have also been detected at relatively low concentrations in a deep (200+ feet) industrial well beneath the site (CH2M HILL 2003a).

Stormwater discharge lines from Northwest Pipe empty into the east end of the International Terminals Slip where potential groundwater seepage locations have been identified (GSI 2003). The trenches associated with the stormwater discharge lines potentially could intercept and/or influence shallow groundwater movement beneath the site.

1.4. Direct Discharge (Overwater Activities and Stormwater/Wastewater Systems)

Stormwater. Stormwater originates in three drainage areas, A, B, and C. Drainage area A covers the southwest and western portions of the facility and discharges near the site's northwest corner. Drainage area B encompasses the east/northeast portion of the site and discharges near

the northeast corner. Area C includes a small area near the northern edge of the site where precipitation is assumed to infiltrate the gravel surface. Stormwater from drainage areas A and B leaves the site through a series of catch basins and pipes and is conveyed to the International Terminals Slip where it discharges through a single, communal Outfall 18/WR-123 (CH2M HILL 2003c). Historic maps indicate drainage to the river via Outfall 1/WR-108, but this has not been confirmed with recent pipe drainage testing.

Wastewater. Northwest Pipe had a 100-J industrial wastewater permit that expired in 2001. According to DEQ's wastewater permits database, the renewal of this permit is pending.

A complete pathway for potential sources from the northern two-thirds of the site to Outfall 18/WR-123 has been confirmed (CH2M HILL 2001a); however, best management practices are currently in place to minimize releases onsite that would contribute to in-river impacts. It is likely that historic releases occurred via the site's stormwater and communal drainage systems, including discharges to Outfall 18/WR-123 (slip) and Outfall 1/WR-108 (river). DEQ (2003) recommended that the LWG collect sediment samples off both outfall locations.

1.5. Relationship of Upland Sources to River Sediments

See Final CSM Update.

1.6. Sediment Transport

This site is not adjacent to the river.

2. CSM SITE SUMMARY REVISIONS

Date of Last Revision: March 4, 2005

3. PROJECT STATUS

Source: DEQ (2004, 1999), CH2M HILL (2000)

Activity		Date(s)/Comments
PA/XPA	☒	PA (CH2M HILL 2000), PA Addendum (CH2M HILL 2001a)
RI	☐	
FS	☐	
Interim Action/Source Control	☒	Soil removal actions in several areas between 1988 and 1991, including the removal of a leaking UST in 1989.
ROD	☐	
RD/RA	☐	
NFA	☐	

Site investigations include: Phase I/II property transfer site assessment (Dames & Moore 1989) defined 14 areas of potential concern as presented here in Section 8; installation and sampling of five monitoring wells (OMNI Environmental 1990); environmental review (URS 2000); Southeast Area Investigation (CH2M HILL 2002); Southeast Area Groundwater Report (CH2M HILL 2003a).

DEQ Portland Harbor Site Ranking (Tier 1, 2, or 3): Tier 2

4. SITE OWNER HISTORY

Primary Sources: CH2M HILL (2000)

Owner/Occupant[1]	Type of Operation	Years
Northwest Pipe Company	Pipe manufacturing	1997 - present
Multnomah Land and Equipment/Northwest Pipe and Casing Co.	Pipe manufacturing	1982/83 - 1997
L.B. Foster Company	Pipe manufacturing	1976 – 1982/83
Beall Pipe and Tank Corp.	Pipe, tank, and trailer manufacturing	1950 - 1976
Oregon Shipbuilding Corp.	Ship building	1937 - 1950
Undeveloped		Prior to 1937

[1] There are several transactions on record associated with this site because portions of the property were bought or sold. Transactions include Terminal Flour Mills Company (1949), Surplus Properties Corporation (1950), Reconstruction Finance Corporation (1951), Lawrence Warehouse Company (1952), Dulien Steel Products, Inc. (1961), and Oregon State Board of Higher Education (1977) (CH2M HILL 2000).

5. PROPERTY DESCRIPTION

Northwest Pipe is located on a 26-acre parcel at approximately RM 4 on the east side of the Willamette River. The parcel is composed of two parcels, Section 35D (26.22 acres) and Section 35C (0.03 acres). The site is about 2,100 feet east of the river, and 1,500 feet north of the International Terminals Slip (CH2M HILL 2000). The site is situated in a mixed industrial, commercial, and residential use area (Integral et al. 2004). The site and surrounding property is zoned and used as heavy industrial. Approximately 16 residences are located 0.7 mile from the facility (Integral et al. 2004).

The Northwest Pipe facility is depicted in Supplemental Figure 3-2 from CH2M HILL (2000). The site consists of a main plant (Bays 1 through 6), an annex (Bay 9), and outside buildings and storage areas. CH2M HILL (2000) indicated that the floors of the main production buildings are made of cement and the buildings are made of metal. Other buildings, structures, and areas of the site that are used for various processes include:

- Administrative office
- Pipe coating and lining operations area (built on cement pad)
- Coal tar storage areas
- General storage area for supplies
- Cement coating operations area
- Flammable materials storage shed
- Pipe and wood cutting sheds
- Belling shed
- Paper Shed
- ASTs - two ASTs near the belling shed and three ASTs near Bay 1.

The site is relatively flat and largely paved. Unpaved areas include a thin strip of property along the eastern boundary of the site, the cement coating and curing operations area, the belling shed, and finished product storage area at the northern portion of the site [Areas 4 and 10, see Supplemental Figure 3-2 from CH2M HILL (2000)].

Northwest Pipe also leases five different areas of the Burgard Industrial Park, totaling 15.5 acres (see Figure 1). These sites are described in greater detail in the Burgard Industrial Park – Noncontiguous Properties Site Summary. No manufacturing occurs on any of these parcels. Only one of the five leased areas (Property 2) is paved.

Runoff drains to catch basins and is conveyed to the Northwest Pipe stormwater system. The site's stormwater drainage plan is shown in Supplemental Figure 3-3 from CH2M HILL (2000).

According to CH2M HILL (2000), the site was undeveloped prior to World War II. In 1937, Oregon Shipbuilding leased and then purchased land in the area of Burgard Industrial Park, including the land occupied by Northwest Pipe. Review of aerial photographs by Integral indicate that the main plant and annex currently used by Northwest Pipe were present as a single building in an aerial photo dated 1948. The grounds immediately outside the main plant buildings in 1948 did not appear to be used. A historic site map available in the Preliminary Assessment Addendum (CH2M HILL 2001a) noted the following features on the site currently occupied by Northwest Pipe:

- Assembly building
- Tool room and weld rod storage
- Hull materials office
- Pipe shop
- Maintenance shop
- PFM (not defined)
- Substations
- Lockers
- Toilets
- Offices
- Union meeting hall.

Since 1956, site features have largely remained the same.

6. CURRENT SITE USE

Northwest Pipe Company manufactures welded steel pipe in two business segments. The Water Transmission Group supplies large-diameter, high-pressure, steel pipe products used primarily for water transmission in the United States and Canada. The Tubular Products Group manufactures smaller-diameter steel pipe for a wide range of construction, agricultural, energy, industrial, and mechanical applications [Northwest Pipe Company (2004), see http://www.nwpipe.com].

Steel pipe is manufactured using electric resistance welding (straight-seam pipe) and submerged arc welding (spiral weld pipe) processes. There are three straight-seam mills and three spiral weld mills. The manufactured pipe ranges in size from 2.375-inch outside diameter to 144-inch outside diameter. Pipes, if requested, can be coated or lined with cement mortar, coal tar enamel, polyethylene tape, rust-inhibitive primers, polyurethane, coal tar epoxy, or paints (CH2M HILL 2001a).

Supplemental Figure 3 from CH2M HILL (2001a) shows the facility's manufacturing areas. Pipe is cut and welded in Bays 1 through 6. Bay 1 is also used for quality control (x-ray) and shipping and receiving. Bay 3 is used for pipe fittings (elbows, tees, manifolds, reducers, and manholes) fabrication. A portion of Bay 4 is used for maintenance. Sand blasting before taping or coating processes is performed in Bay 9. A hydrotest facility is also located in Bay 9. Pipe lacquering occurs in the Bay 9 annex. Outside of the main building, cement mortar lining and coating is applied in the Cement Plant and cured in bays adjacent to the Cement Plant. Paint and coal tar enamel are applied in the Lining and Coating facility on the west edge of the property. Wood cutting, pipe cutting, and pipe belling occur in small sheds on the northern side of the property. A steam cleaning/wash pad with a closed sump is located undercover in the paper shed. The wash pad sump is pumped as needed for proper disposal. The remainder of the site is used for storage or shipping (CH2M HILL 2001a).

Chemicals are used onsite for two purposes: as primers and coatings for pipe and as cleaning or thinning agents. Northwest Pipe is listed as a RCRA small-quantity generator. As a small-quantity generator, Northwest Pipe uses aerosol degreasers, aerosol cleaners, and soluble oil. Used epoxy thinner, used

epoxy thinner absorbent, used oil, and hydraulic fluids are also generated onsite. Wastes are disposed of in the following manner:

- Offsite waste management facility – paint sludge still bottoms, jelled residual paints, cresol contaminated materials (from coal tar enameling)
- Landfill – sand/cement grit, polyethylene tapes, baghouse dust, punctured aerosol cans, welding flux, mill sludge
- Offsite waste oil recycler – used oil.

Manifests from 1998 listed 7,618 pounds of used epoxy thinner and 11,306 pounds of used epoxy thinner mixed with absorbent as being shipped from Northwest Pipe for proper disposal (CH2M HILL 2000).

Petroleum products used and stored (undercover in Bay 1) include motor oil, used motor oil, hydraulic fluid, antifreeze, and used antifreeze. There are five aboveground storage tanks: a 2,000-gallon, double-walled diesel tank; a 250-gallon gasoline tank; two 250-gallon hydraulic and motor oil tanks; and one 350-gallon hydraulic oil tank. All have secondary containment and drip pads (CH2M HILL 2000).

The largest quantity of any chemical stored onsite is coal tar enamel. It was estimated that 100,000 pounds of coal tar enamel was stored onsite in 2000. Coal tar is solid at ambient temperatures and is stored outside on unpaved areas. Other chemicals (besides coal tar and petroleum products above) stored onsite in 2000 included standard welding supplies, clear sealer, tank coating, primer 1019, aerosol coatings, Reilly's 122 primer, soluble oil B, methyl ethy ketone, epoxy thinner 4A, and xylene (CH2M HILL 2000).

7. SITE USE HISTORY

This parcel was part of the Oregon Shipbuilding Corporation during WWII years, and activities onsite included warehousing, woodworking, and shipbuilding. The Preliminary Assessment (PA) addendum (CH2M HILL 2001a) indicated that the site currently owned by Northwest Pipe was dominated by the shipbuilder's Assembly Building. Steel plate, shaped and cut east of the Northwest Pipe site, was transferred to the Assembly Building where it was welded into large ship sections weighing as much as 250 tons. Ship pieces were then transported by rail to the shipways located on the river.

The property was purchased by Beall Pipe and Tank Corporation (Beall) in 1950 and was used for pipe, tank, and trailer manufacturing (DEQ 1999). Beall's primary manufacturing focus was irrigation pipe. Processes included electric resistance welding (straight-seam pipe) and submerged arc welding (spiral weld pipe). Pipe was also produced using the pyramid roll process. Beall manufactured potable water pipe, custom pipe and tanks, square and rectangular tubing, corrugated culvert, tanks, and pressure vessels. Tanks for tanker trucks were made in portions of Bay 1 and Bay 2; galvanized culvert pipe was riveted and spot welded in Bay 4; and asphalt wrap was applied in Bay 9. The asphalt coating operations were reduced in the 1970s and discontinued in approximately 1976. Beall leased storage space to American Steel Company (dates unknown), and in approximately 1970, a Japanese company named Okura became a co-owner of Beall.

Beall was sold to L.B. Foster Company around 1976 and continued to manufacture water pipe and tubular pipe, primarily for irrigation. The pyramid roll process was discontinued. In 1982 or 1983, Multnomah Land and Equipment purchased the property and leased it to Northwest Pipe & Casting Company. Northwest Pipe later bought the land in 1997.

Northwest Pipe removed a leaking underground storage tank and about 1,900 cubic yards of soil contaminated with gasoline, oil, PAHs, chlorinated solvents, and PCBs from the site in 1988-1991 (LUST site #26-89-0047), as part of a voluntary cleanup of the facility. Although the cleanup did not receive final DEQ approval, there was insufficient information to add the site to DEQ's Confirmed Release List or Inventory.

8. CURRENT AND HISTORIC SOURCES AND COPCS

The current understanding of the historic and current potential upland and overwater sources at the site is summarized in Table 1. The following sections provide a brief overview of the potential sources at the site requiring additional discussion.

8.1. Uplands

The sources listed in Table 1 and discussed below are potential areas of environmental concern identified in DEQ's Strategy Recommendation (DEQ 1999) and the PA (CH2M HILL 2000):

- **Area 1** – Aboveground waste oil tank and ten 55-gallon drums of petroleum/paved
- **Area 2** – Pipe lining and coating building (northwest corner – stained soil)/unpaved
- **Area 3** – Pipe lining and coating building (southeast corner – stained soil and concrete)/unpaved
- **Area 4** – 2,000-gallon AST and pumps (stained soil)/unpaved
- **Area 5** – Transformer storage/paved
- **Area 6** – Sixteen 55-gallon drums of solvent with no containment/paved
- **Area 7** – Industrial well/paved
- **Area 8a** – 1,000-gallon gasoline UST/unpaved
- **Area 8b** – Bay 9 asphalt dipper tank/paved
- **Area 9** – Railroad spur (stained soil)/unpaved
- **Area 10** – Dust suppressant use and storage/paved
- **Area 11** – Transformer area (stained soil)/paved?
- **Area 12** – Alleged solvent dumping area/paved
- **Area 13** – Alleged petroleum dumping area (lay down area south of main building)/paved
- **Area 14** – Onsite catch basins associated with a wash pad and stormwater system/unpaved.

According to CH2M HILL (2001b), DEQ determined that 6 of the 14 areas needed no further action, but additional sampling was required at the remaining eight (Areas 1-3, 5, 7, 9, 12, and 14). Based on sampling efforts performed by CH2M HILL (2001b) in 2001, Area 1 (southeast area) remained a concern particularly in terms of groundwater and soils, and additional sampling took place to address these concerns. In addition, DEQ recommended the completion of a stormwater system investigation to evaluate potential contaminant source pathways to the river.

8.2. Overwater Activities

☐ Yes ☒ No

This site is not adjacent to the river.

8.3. Spills

Known or documented spills at the Northwest Pipe facility were obtained either from DEQ's Emergency Response Information System (ERIS) database for the period of 1995 to 2004, from oil and chemical spills recorded from 1982 to 2003 by the U.S. Coast Guard and the National Response Center's centralized federal database [see Appendix E of the Portland Harbor Work Plan (Integral et al. 2004)], from facility-specific technical reports, or from DEQ correspondence.

Date	Material(s) Released	Volume Spilled (gallons)	Spill Surface (gravel, asphalt, sewer)	Action Taken (yes/no)
2/9/96	Primer	55	building floor	Y – contained in building
7/7/99	Xylene	37	building floor	Y – contained in building

DEQ's ERIS' database contains several incidents of oily sheens observed on the river surface in the International Terminals Slip. The sources of these spills are unknown, but could have originated from stormwater outfalls.

9. PHYSICAL SITE SETTING

The environmental investigations performed at Northwest Pipe Company site include the following:

- Dames & Moore (1989) and Crosby & Overton (1989)
  - Completed soil and groundwater investigations at a number of areas of concern at the property identified during a Phase I/II property transfer site assessment.
- OMNI Environmental (1990)
  - Completed a follow-up groundwater investigation at one of the area of concerns and installed five monitoring wells.
- CH2M HILL
  - Completed follow-up soil and groundwater investigations at a number of the areas of concern in September 2001 and August 2002, installing 19 borings for soil and groundwater sampling [see Supplemental Figure 1 from CH2M HILL (2001b) and Supplemental Figure 1 from CH2M HILL (2002)].
- CH2M HILL
  - Three monitoring wells were installed at the site in July 2003 [see Supplemental Figure 2 from CH2M HILL (2003a)].

The Schnitzer Burgard Industrial Park is fairly level with ground-surface elevations ranging between 20 and 30 feet above msl. The topography of the Schnitzer Burgard Industrial Park gently slopes from east to west, with the exception of a steep embankment along the Willamette River and the slip channel (DEQ 1999). The western edge of Northwest Pipe is located approximately 0.5 mile east of the Willamette River and approximately 0.25 mile east of the International Terminals Slip. The facility is located on the floodplain of the Willamette River (CH2M HILL 2000).

9.1. Geology

The geology beneath the site is summarized from the site's soil borings, monitoring wells and the onsite industrial production well (State well report MULT 1824). The near-surface geology at the Schnitzer Burgard Industrial Park is dominated by the presence of dredge fill placed during the development of the industrial park in the late 1930s and during filling of the shipways in the later 1960s and early 1970s. The dredge fill, consisting of a mixture of brown sand and silty sand, varies in thickness across the Schnitzer Burgard Industrial Park from 25 to 35 feet along the river and thinning to 15 feet along the eastern edge of the site (Bridgewater 2001). The depth of the dredge fill at Northwest Pipe ranges from 2 to approximately 20 feet bgs based on soil probe borings and a lithologic log from an onsite industrial production well.

Underlying the dredge fill to an approximate depth of 160 feet bgs are Quaternary alluvial deposits consisting of interbedded sands and silty clay. Below 160 feet, these deposits are composed predominantly of sand with gravel lenses to 220 feet bgs (CH2M HILL 2000). The coarser-grained material may represent Pleistocene flood gravels (Quaternary alluvial deposit) and/or possibly the Troutdale Formation. Between 220 and 258 feet bgs, silty clay and clay with minor lenses of gravel were noted (CH2M HILL 2000). The latter unit may represent the Sandy River Mudstone. The Oregon Water Resource Department well identification number for the onsite industrial production well is MULT 1824.

No site-specific cross sections have been constructed for Northwest Pipe during past investigations.

9.2. Hydrogeology

Nine monitoring wells have been completed during past investigations in the dredge-fill and/or alluvium to a maximum depth of approximately 25 feet bgs (CH2M HILL 2000 and 2003a). The onsite industrial production well is completed at a depth of 220 feet bgs (drilled and logged to a depth of 258 ft bgs) and is completed in coarser-grained Pleistocene flood gravels and/or possibly the Troutdale Formation. According to CH2M HILL (2001a), water from this industrial well is used as non-contact cooling water for pumps, as cement mortar make-up water, and as a source of water for hydrotesting finished pipes. The majority of groundwater flow and hydraulic gradient information at the property pertains to the shallow subsurface: the dredge fill and underlying alluvium to a depth of approximately 30 feet bgs.

A shallow unconfined groundwater zone is present within the lower portions of the dredge fill and the alluvial deposits underlying the dredge fill, based upon probe and monitoring well data.

The groundwater flow direction in the northeastern portion of the Northwest Pipe property was determined to be toward the west-northwest (CH2M HILL 2001b). During a subsequent investigation, additional monitoring wells were installed, and the groundwater flow direction in the southeastern portion of the property was determined to be toward the south-southwest (CH2M HILL 2003a). Overall, the groundwater flow appears to be generally toward the Willamette River at a low gradient with local variations in flow direction across the site. Site-specific information related to groundwater gradient is limited. CH2M HILL (2003a) estimated that the hydraulic gradient in the southeastern portion of the property was relatively flat (values ranging from 0.001 to 0.0014).

Seep Locations. Northwest Pipe does not border the shoreline of either the International Terminals Slip or the Willamette River. However, stormwater discharge lines from Northwest Pipe empty into the east end of the slip (Outfall 18/WR-123) and along the Willamette (Outfall 1/WR-108) [see Supplemental Figure 1-3 from Bridgewater (2003)]. Potential seepage locations were identified at the east end of the slip (GSI 2003). These potential seepage locations were in the backfill next to an outfall and along the steep shoreline embankment at the east end of the slip. The seep locations were highlighted by iron (ferric hydroxide) staining and iron bacteria slime (GSI 2003). The relationship, if any, of these seeps to Northwest Pipe has not been evaluated.

10. NATURE AND EXTENT (*Current Understanding*)

The current understanding of the nature and extent of contamination for the uplands portions of the site is summarized in this section. When no data exist for a specific medium, a notation is made.

10.1. Soil

10.1.1. Upland Soil Investigations

☒ Yes ☐ No

During a 1989 Phase II investigation, surface soil in the northwest portion of the site was found to be contaminated with 0.31 ppm tetrachloroethene and 22,000 ppm TPH. The work scope associated with this sampling program was not available in the documents reviewed.

The following soils data were summarized by CH2M HILL (2000) and CH2M HILL (2001b) by area of concern. Neither the scope of work associated with the soils investigation or soil chemistry data tables were available in the documents reviewed.

Area 1 – Soil samples were collected from stained soil located adjacent to an aboveground waste oil tank and ten 55-gallon drums of petroleum. PAH compounds were detected in two samples collected 1.6 and 1.7 ft bgs, respectively. PCE and 1,1,1-

trichloroethane (1,1,1-TCA) were also detected in one of the surface soil samples. Soils were removed from the area, and PCE was detected at 0.17 mg/kg in soil from the east wall and 0.16 mg/kg in a composite sample from the bottom of the excavation (9 ft bgs). These values were reported to be below DEQ's soil cleanup value for PCE.

In 2001, CH2M HILL advanced Geoprobes™ to a depth of 18 ft at two locations (GP1 and GP2) within Area 1. Using PID screening methods, soil samples were selected from 6 ft bgs at GP1 and 18 ft bgs at GP2 and analyzed for VOCs, TPH, and PAHs. TPH and PAHs were not detected in either sample. VOCs were not detected in the sample collected from GP1 (6 ft bgs), but the soil sample collected from GP2 (18 ft bgs) contained PCE (0.726 mg/kg), TCE (0.0252 mg/kg), and cis-1,2-dichloroethene (0.0211 mg/kg).

Soil samples were collected in 2002 as part of the Southeast Area Investigation (CH2M HILL 2002). This study was performed to more fully characterize the nature and extent of VOCs detected in groundwater in September 2001. Three samples were collected and analyzed for VOCs based on elevated PID readings. A Geoprobe™ advanced to 16 ft bgs was sampled for VOCs at 9 ft bgs. PCE was detected at 0.0376 mg/kg (GP-03). Two samples collected at 2.5 ft bgs and 13.5 ft bgs from GP-03 had detectable concentrations of PCE at 0.0148 mg/kg and 0.0024 mg/kg, respectively. TCE was also detected at 0.0014 mg/kg in the 2.5-ft bgs sample. No other VOCs were detected. Detected values were below DEQ's soil cleanup levels, suggesting an offsite source (CH2M HILL 2002).

Area 2 – Soil samples were collected from stained soil located adjacent to the northwest corner of the pipe lining and coating building. Dames & Moore (1989) collected six soil samples from Area 2. Low levels of PAH compounds, PCE, and TPHs were detected in samples collected from the top 2 feet. Soils were removed from the area, and confirmation sampling indicated that soils no longer contained detectable concentrations of PAHs, TPHs, or VOCs.

Area 3 - Soil samples were collected from stained soil and concrete located adjacent to the southeast corner of the pipe lining and coating building. Dames & Moore (1989) collected six soil samples from Area 3. PAH compounds, TPHs, TCE, PCE, and 1,1,1-TCA were detected largely in the top 2 feet. The deepest sample collected (8 ft bgs) contained low levels of PAHs and PCE, which were below DEQ's soil cleanup levels. Soils were removed from the area, and confirmation sampling indicated that VOCs and TPHs were still present at detectable levels. PCE concentrations ranged from 0.34 to 12.1 mg/kg. DEQ's industrial cleanup level is 10 mg/kg. 1,1,1-TCA concentrations ranged from less than 0.005 to 0.49 mg/kg, below DEQ's industrial soil cleanup level. TPH concentrations ranged from 8 to 330 mg/kg.

Area 4 – Soil samples were collected from the area affected by a leaking UST. Soils data are not provided in CH2M HILL's PA (2000); however, it was noted that benzene, toluene, ethylbenzene, and xylenes were detected in soils at "small" concentrations.

Area 5 – Soil samples were collected from depths ranging from 1 to 10 ft to investigate potential leaks from stored transformers. TPH concentrations were detected at elevated levels in surface samples but significantly decreased with depth. TPH concentrations ranged from less than 5 mg/kg at depth to 11,000 mg/kg in surface soils (maintenance shop). PCBs were detected at 0.7 mg/kg in surface soil in the vicinity of the maintenance shop and 3.1 mg/kg in front of the transformers. At both of these locations, PCBs were not detected at a depth of 4 ft bgs.

In 2001, CH2M HILL (2001b) collected surface soil samples (approximately 0.5-0.75 ft bgs) from two locations (SS1 and SS2) within Area 5. Samples were analyzed for TPH and PCBs. PCBs were detected at concentrations of 2.67 (SS1) and 6.16 mg/kg (SS2).

These levels are below DEQ's generic risk-based level for industrial land use areas. TPH-D was detected at concentrations of 46 to 603 mg/kg, and TPH-O ranged in concentration from 85 to 2,100 mg/kg.

Area 6 – Soil samples were collected in 1989 from an area used to store 55-gallon drums of solvent without containment. No VOCs were detected in two samples collected by Dames & Moore (1989) from Area 6. Crosby and Overton (1989) later collected soil samples from two locations at 1 and 2 ft bgs, respectively. TPHs were detected in all four samples. TPH concentrations decreased substantially over the 1-ft interval (i.e., from 2,900 mg/kg to 10 mg/kg).

Area 7 – This area is the industrial well, no soil samples were collected.

Area 8a, Area 9, Area 10 – No soils data were described in the PA because these areas required *No Further Action,* as determined by DEQ in 1990. However, the PA addendum (2001a), noted that TPH was present in an Area 9 surface soil sample at a concentration of 22,000 mg/kg prior to soil removal. PCE was also detected (0.31 mg/kg). At 2 ft bgs, TPH was detected at 88 mg/kg and PCE was detected 0.2 mg/kg. After soil was removed from the area, PCE ranged from 0.14 to 0.16 mg/kg at 4 ft bgs. It appeared that the contamination was confined to surficial soils in Area 9. Area 9 is the location of a railroad spur with stained soils.

Area 8b – One soil sample was collected next to the asphalt dipper tank. TPH was not detected at 1 mg/kg.

Area 11 - No soils data are described in the PA for this area (former transformer storage area). EPA indicated that it was no longer an area of concern based on a 1991 inspection (CH2M HILL 2001b).

Area 12 - Soil samples were collected from this area to detect former alleged solvent dumping activities. No VOCs were detected in one sample collected by Dames & Moore in 1989 at 1 ft bgs. Crosby and Overton (1989) later collected soil samples at 1 and 2 ft bgs for TPH and VOCs analysis. TPH concentrations ranged from 180 to 750 mg/kg. VOCs were not detected with the exception of one sample (PCE at 0.3 mg/kg at 1 ft bgs). Soils were removed from the area, and TPH was detected in two confirmation samples at concentrations of 610 and 670 mg/kg. PCE concentrations ranged from less than 0.005 to 0.011 mg/kg.

In 2001, three soil samples were collected from a Geoprobe™ advanced to a depth of 16 ft (GP5). Soil samples were analyzed for VOCs. VOCs were not detected in a sample collected from 0.5 ft bgs; however, methylene chloride was detected at low levels: 0.0012 mg/kg at 3 ft bgs and 0.0013 mg/kg at 6 ft bgs.

In 2002, two soil samples were collected from GP5 at 2.5 ft bgs and 13.5 ft bgs based on elevated PID readings. Soil from 2.5 ft bgs contained 0.0148 mg/kg PCE and 0.0014 mg/kg TCE. Soil from 13.5 ft bgs contained 0.0024 mg/kg PCE.

Area 13 – Dames & Moore (1989) collected two shallow surface soil samples (top 3 inches) through the asphalt pavement to monitor former alleged petroleum dumping in this area. TPHs were detected at 1,200 mg/kg and 2,800 mg/kg and may have been related to the asphalt itself.

Area 14 – Area 14 was investigated to characterize onsite catch basin solids associated with a wash pad and stormwater system. The results of the investigation are described in Section 10.3.4.

10.1.2. Riverbank Samples

☐ Yes ☒ No

10.1.3. Summary

Historic releases, including a leaking UST, contributed to surface and subsurface contamination. Soil sampling has determined that concentrations are generally below DEQ's industrial soil cleanup levels; however, elevated concentrations appear to remain in limited, distinct areas. In addition, most of the site (84%) is covered with impermeable surfaces, greatly restricting the potential for overland transport.

10.2. Groundwater

Groundwater investigations at the site since 1989 have included sampling groundwater from 19 temporary well points installed in the soil probe borings, nine monitoring wells, and an onsite industrial production well. All the temporary well points were abandoned after groundwater samples were collected. Four of the monitoring wells were abandoned in 2003 (CH2M HILL 2003c) and two have not been located in recent attempts.

10.2.1. Groundwater Investigations

☒ Yes ☐ No

Crosby & Overton installed one monitoring well in 1989 and OMNI Environmental installed five additional wells in 1990 in the northeast corner of the Northwest Pipe Company property (CH2M HILL 2000). Information regarding the sampling dates and analytical data for these six monitoring wells is poorly documented. These six monitoring wells were installed to assess potential impacts associated with a diesel UST in Area 4 that was granted *No Further Action* by the DEQ in 1990 (CH2M HILL 2000).

Three additional investigations collected shallow groundwater data at the site. CH2M HILL completed 7 soil probe borings in September 2001 and an additional 12 soil probe borings in August 2002 [see Supplemental Figures 1 from CH2M HILL (2001b) (2002)] in response to DEQ request for further investigation of areas of potential environmental concern originally identified in the PA (CH2M HILL 2000). Groundwater samples collected from temporary well points were analyzed for VOCs and TPH. CH2M HILL (2003a) installed three monitoring wells in July 2003 to obtain additional groundwater information to further investigate the presence of VOCs in groundwater [see Supplemental Figure 2 from CH2M HILL (2003a)]. Groundwater samples collected from the monitoring wells were analyzed for VOCs.

The onsite industrial production well [see Supplemental Figure 1 from CH2M HILL (2001b)] was sampled three times by Dames & Moore in 1989, and the groundwater samples were analyzed for PCBs, TPH, and VOCs. CH2M HILL sampled the onsite industrial well in 2001, and analyzed the groundwater sample for VOCs as requested by the DEQ to further investigate the groundwater quality in the deep aquifer at the site. In summary, most groundwater samples collected during site investigations have been collected from temporary well points installed in soil probe borings. Nine monitoring wells have been installed during site investigations; however, only the three monitoring wells installed in 2003 (CH2M HILL 2003a) are functional for groundwater sample collection. These three monitoring wells are located in the southeast corner of the Northwest Pipe property, in an area where the highest levels of VOCs have been detected.

10.2.2. NAPL (Historic & Current)

☐ Yes ☒ No

DEQ stated concern that the previously detected VOC concentrations in GP-1 and GP-2 of up to almost 10 mg/L tetrachloroethylene [see Supplemental Figure 3 from CH2M HILL (2003a)] suggest the potential presence of DNAPL (DEQ 2004a, pers. comm.).

10.2.3. Dissolved Contaminant Plumes

☒ Yes ☐ No

Shallow groundwater COIs include VOCs (chlorinated solvents), SVOCs, PAHs, and TPH. Dissolved COIs have been detected in groundwater monitoring wells and groundwater collected from site borings. Constituents historically detected in shallow groundwater include:

VOCs	SVOCs	TPH
Tetrachloroethene (PCE)	Fluoranthene	TPH-Gasoline
Trichloroethene (TCE)		
1,1-Dichloroethane (1,1-DCA)		
1,1-Dichloroethene (1,1-DCE)		
cis-1,2-Dichloroethene (c-1,2-DCE)		
trans-1,2-Dichloroethene (t-1,2-DCE)		
Chloroform		
1,1,1-Trichloroethane(1,1,1 TCA)		
1,1,2-Trichloroethane		
Vinyl Chloride		

Plume Characterization Status ☐ Complete ☒ Incomplete

The VOC plume characterization status is incomplete. DEQ does not consider the three monitoring wells installed by CH2M HILL in 2003 [see Supplemental Figure 3 from CH2M HILL (2003a)] adequate for delineating the extent of the VOC plume (DEQ 2004b, pers. comm.).

Plume Extent

Groundwater samples collected from the alluvial groundwater zone have had detections of VOCs, SVOCs, and TPH. Based on data provided in the (2003a), GSI has interpreted the two VOC plumes (chlorinated solvents) in the shallow groundwater beneath the site shown in Figure 2.

The first VOC plume is located in the southeast corner of the Northwest Pipe property. The highest concentration of VOCs was 9,800 µg/L of PCE (sampled in September 2001) in GP-1, located along the eastern property boundary of Northwest Pipe [see Supplemental Figure 3 from CH2M HILL (2003a)]. The full extent of this VOC plume has not been delineated, but it appears to extend beyond the Northwest Pipe property toward the southeast. The source of the chlorinated solvents has not been determined by site investigations. The southeast corner of Northwest Pipe is referred to as Northwest Pipe Property 2 in site investigation reports. This 3.5-acre piece of property adjacent to Northwest Pipe has been leased from Burgard Industrial Park by Northwest Pipe Company (Bridgewater 2000). It is unclear in the site investigations specific to Northwest Pipe Company whether the Northwest Pipe Property 2 is still a leased property or whether it was purchased by Northwest Pipe Company.

The second VOC plume (chlorinated solvents) extends beneath the central portion of the Northwest Pipe property (see Figure 2). The full extent of this VOC plume has not been delineated, but it appears to extend beyond the Northwest Pipe property to the southwest. Various chlorinated solvents have been detected in groundwater throughout the property, with the exception of MW-2, which was non-detect for all VOCs [see Supplemental Figure 3 from CH2M HILL (2003a)].

The source and extent of the chlorinated solvents in groundwater has not been established by past investigations, and the DEQ has expressed uncertainty regarding the plume extent and source (DEQ 2004b, pers. comm.)

TPH has not been consistently analyzed in groundwater samples; accordingly, the detections of TPH are identified as isolated impacts to groundwater.

Industrial Water Well. Low levels (≤ 0.5 µg/L) of chlorinated solvents also have been detected in the onsite industrial production well (the completed depth of the well is 220 feet bgs). It has been suggested that the low levels of chlorinated solvents detected in the onsite production well may be related to a regionally dispersed deep chlorinated solvent plume in north Portland (CH2M HILL 2000).

Fluoranthene (the only SVOC detected) was detected in the initial groundwater sample from the onsite industrial production well; subsequent groundwater samples have not detected fluoranthene. The source of the fluoranthene in groundwater at the onsite industrial production well was attributed to past use of an oil-lubricated vertical turbine pump (CH2M HILL 2000). TPH also was detected in the onsite industrial production well and was also attributed to the oil-lubricated pump (CH2M HILL 2000). TPH also was detected at several other groundwater sampling locations; however, TPH has not been consistently analyzed in groundwater samples, so the distribution and trends in TPH concentrations have not been evaluated.

Min/Max Detections (Current situation)

The most recently reported groundwater samples were collected in July 2003 (CH2M HILL 2003a). The minimum and maximum detections in groundwater are provided in the table below.

Analyte	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)
Volatile Organic Compounds (VOCs)		
Tetrachloroethene (PCE)	< 0.5	9,800
Trichloroethene (TCE)	< 0.5	1,210
1,1-Dichloroethane (1,1-DCA)	< 1	3.7
1,1-Dichloroethene (1,1-DCE)	< 1	21.5
cis-1,2-Dichloroethene (c-1,2-DCE)	< 1	4,210
trans-1,2-Dichloroethene (t-1,2-DCE)	< 1	12.8
Chloroform	< 1	1.8
1,1,1-Trichloroethane	< 1	1.1
1,1,2-Trichloroethane	< 1	1.1
Vinyl Chloride	< 1	47.6
Semivolatile Organic Compounds (SVOCs)		
Fluoranthene	< 0.1	0.026
Total Petroleum Hydrocarbons (TPH)		
C7 - C12 Range	170	18,000

Current Plume Data

The current estimated extent of the two chlorinated VOC plumes in the shallow groundwater zone is shown in Figure 2. TPH has not been consistently analyzed in groundwater samples; therefore, the distribution and trends in TPH concentrations have not been evaluated.

Preferential Pathways

Stormwater discharge lines from Northwest Pipe empty into the east end of the International Terminals Slip (Outfall 18/WR-123) and potentially along the Willamette River (Outfall 1/WR-108) [see Supplemental Figure 1-2 from Bridgewater (2003)]. The utility trenches containing the stormwater discharge lines beneath the site potentially could be intercepting shallow groundwater flow beneath the site; however, this potential for intercepting shallow groundwater has not been evaluated.

Downgradient Plume Monitoring Points (min/max detections)

An adequate monitoring well network (including downgradient plume monitoring points) for delineating the extent of the VOC plume has not been established (DEQ 2004b, pers. comm.).

Visual Seep Sample Data ☐ Yes ☒ No

Northwest Pipe borders neither the shoreline of the International Terminals Slip nor the Willamette River. Additional discussion is presented in Section 9.2.

Nearshore Porewater Data

No nearshore porewater data associated with this site have been collected.

Groundwater Plume Temporal Trend

Groundwater sampling is limited to one event in the three monitoring wells (installed in July 2003) and temporary well points. No groundwater plume temporal trends can be evaluated from the limited data set.

10.2.4. Summary

Groundwater investigations at the site since 1989 have included sampling groundwater from 19 temporary well points installed in the soil probe borings, 9 monitoring wells, and an onsite industrial production well. VOCs (chlorinated solvents), SVOCs (fluoranthene only), and TPH have been detected in groundwater. Two chlorinated solvent plumes have been identified at the site. The first is located in the southeast corner of the property, and the other extends beneath the center of the Northwest Pipe property. Both plumes appear to extend beyond the Northwest Pipe property boundary. The source(s) of the VOC plumes has not been determined by site investigations.

Fluoranthene (SVOC) was detected in the initial groundwater sample from the onsite industrial production well; subsequent groundwater samples have been non-detect. The source of the fluoranthene in the onsite industrial production well (as well as detected TPH) was attributed to past use of an oil-lubricated vertical turbine pump (CH2M HILL 2000). TPH also was detected at several other groundwater sampling locations at Northwest Pipe; however, TPH has not been consistently analyzed in groundwater samples so the distribution and trends in TPH concentrations have not been evaluated.

10.3. Surface Water

10.3.1. Surface Water Investigation ☒ Yes ☐ No

CH2M HILL completed a stormwater characterization study in 2003. Stormwater data are summarized below.

10.3.2. General or Individual Stormwater Permit (Current or Past) ☒ Yes ☐ No

Permit Type	File Number	Start Date	Outfalls	Parameters/Frequency
GEN12Z	6739	10/28/97	Outfall 18/WR-123	Standard[1]

[1] Standard GEN12Z permit requirements include pH, oil and grease, total suspended solids, copper, lead, zinc, and visual monitoring. Monitored twice yearly.

Do other non-stormwater wastes discharge to the system? ☐ Yes ☐ No

Unknown.

10.3.3. Stormwater Data ☒ Yes ☐ No

Stormwater originates in three Northwest Pipe drainage areas, A, B, and C [see Supplemental Figure 1 from CH2M HILL (2002)]. Drainage area A covers the southwest and western portions of the facility and discharges near the site's northwest corner. Drainage area B encompasses the east/northeast portion of the site and discharges near the northeast corner. Area C includes a small area near the northern edge of the site where precipitation is assumed to infiltrate the gravel surface. In the area of the cement plant, stormwater runoff, if any, is expected to flow into process settling vaults arranged to separate mortar solids from water. Stormwater from drainage areas A and B leaves the site through a series of catch basins and pipes and is conveyed to the International Terminals Slip where it discharges through a single, communal outfall (Outfall 18/WR-123) (CH2M HILL 2003c).

NPDES monitoring conducted at WR-123 in 1998-1999 found 2.4 mg/L of zinc and trace amounts of cadmium, chromium, and lead. Up to 26 mg/L of oil and grease was detected in 1993 (DEQ 1999).

Stormwater samples were collected in 2003 from five locations shown in Supplemental Figure 1, Stormwater System Sampling Locations, from CH2M HILL (2003b). Sample locations were selected to evaluate stormwater quality entering and leaving the Northwest Pipe site:

- **CB1** was collected from a catch basin *offsite* near southeast corner to monitor stormwater flowing onto the site from North Terminal Road and areas east.
- **CB5** was collected *offsite* northeast of Northwest Pipe from a catch basin draining a stormwater line running from Ryerson to a communal outfall.
- **CB2** was collected *onsite* from a catch basin in the southeast corner to compare to nearby CB1.
- **CB3 and CB4** were collected *onsite* from two pipes that convey stormwater to communal Outfall 18 (WR-123).

Samples were analyzed for PAHs, PCBs, dissolved and total metals, pH, oil and grease, and TSS. Results were compared to DEQ's risk-based Level II screening level values (SLVs) for freshwater. Benzo(a)anthracene exceeded the SLV in four of five samples (2 onsite and 2 offsite), and benzo(a)pyrene exceeded the SLV in three of five samples (1 onsite and 2 offsite). Several total metals exceeded SLVs, but only two dissolved metals (manganese and zinc) exceeded SLVs in onsite samples. The highest number of metal (total and dissolved) exceedances occurred in offsite samples. However, exceedances among all samples appear to be highly correlated with high TSS values; samples were collected during a rainy period (CH2M HILL 2003b).

It should be noted that a second outfall, Outfall 1 or WR-108 is shown on historical Oregon Shipbuilding Corporation maps to drain the southern third of the Northwest Pipe

site (CH2M HILL 2001a). CH2M HILL (2001a) performed a dye study of Northwest Pipe stormwater drainage and did not observe dyes exiting from Outfall 1/WR-108. A representative from Schnitzer (not named) indicated that the outfall is plugged on Schnitzer's property between Northwest Pipe and the river. CH2M HILL (2001a) confirmed that the northern two-thirds of the site currently discharge to Outfall 18/WR-123, but that there was no confirmation on the location of stormwater discharge from the southern third of the Northwest Pipe property.

10.3.4. Catch Basin Solids Data

☒ Yes ☐ No

Dames & Moore (1989) collected two samples and two duplicate samples of sludge from a catch basin located in the southwest corner of the site in 1989. One pair of samples was analyzed for VOCs, and the other pair was analyzed for PAHs and TPH. PCE ranged in concentration from 0.055 mg/kg to 0.73 mg/kg. TPH ranged in concentration from 2,500 to 3,300 mg/kg (CH2M HILL 2000). In 1989, Crosby & Overton removed the top 2 ft of sludge from the bottom of the catch basin and tested the material for disposal purposes (CH2M HILL 2001a). Metals and VOCs were not detected, TPH was detected at 740 mg/kg, and PCBs were detected at 4.5 mg/kg (CH2M HILL 2000). This catch basin is currently empty and no longer in use (CH2M HILL 2001a).

10.3.5. Wastewater Permit

☒ Yes ☐ No

The facility had a 100-J permit to discharge non-contact cooling water via pipe to the slip. Northwest Pipe received a *Notice of Noncompliance* from DEQ in 1989 for lack of monitoring and another in 1983 for not submitting an annual report (DEQ 1999).

Permit Type	Permit No.	Start Date	Outfalls	Volumes	Parameters/Frequency
GEN01/100-J	6739	9/25/81	Unknown	unknown	Standard[1]

[1] Standard GEN01 permit requirements include flow, temperature, pH, and total residual chlorine. Other parameters may apply.

10.3.6. Wastewater Data

☐ Yes ☒ No

10.3.7. Summary

There is the potential for historic transport of contaminants from Northwest Pipe to the Willamette River and International Terminals Slip through the site's stormwater conveyance system. Currently, best management practices (regular replacement of catch basin socks and catch basin cleanings) at Northwest Pipe help prevent releases from occurring through Outfall 18/WR-123.

10.4. Sediment

10.4.1. River Sediment Data

☐ Yes ☒ No

10.4.2. Summary

NW Pipe's stormwater exits the site through a communal stormwater system. Sediment chemistry data are not summarized here for this reason; however, sediment chemistry data are summarized in the site summary for Burgard Industrial Park (Schnitzer Steel/Calbag Metals) ECSI #2355.

11. CLEANUP HISTORY AND SOURCE CONTROL MEASURES

11.1. Soil Cleanup/Source Control

Contaminated soil and a leaking underground storage tank were removed from Northwest Pipe between 1988 and 1991. The following information was contained in the PA (CH2M HILL 2000):

- **Area 1** – Soils impacted with VOCs were excavated to 9 ft bgs, removing 170 cubic yards (cy) (20 cy disposed offsite and 150 cy placed in an onsite bermed treatment area for aeration).
- **Area 2 & 3** – A total of 40 cy of contaminated soil impacted with PAHs, TPHs, and VOCs_were removed from, presumably, the top 4-8 ft. Soil was placed in an onsite bermed area for treatment.
- **Area 4 & 8a** – A total of 300 cy of soil contaminated by a leaking UST were removed. The disposal location was not indicated in the documents reviewed.
- **Area 12** – A total of 15 cy of soil impacted with TPHs and VOCs_were removed from approximately the top 2 ft to an onsite bermed area.

11.2. Groundwater Cleanup/Source Control

There is no history of groundwater cleanup or groundwater source control at Northwest Pipe Company.

11.3. Other

In 1989, sludge was removed from a catch basin and contained in two drums for offsite disposal (CH2M HILL 2000).

11.4. Potential for Recontamination from Upland Sources

See Final CSM Update.

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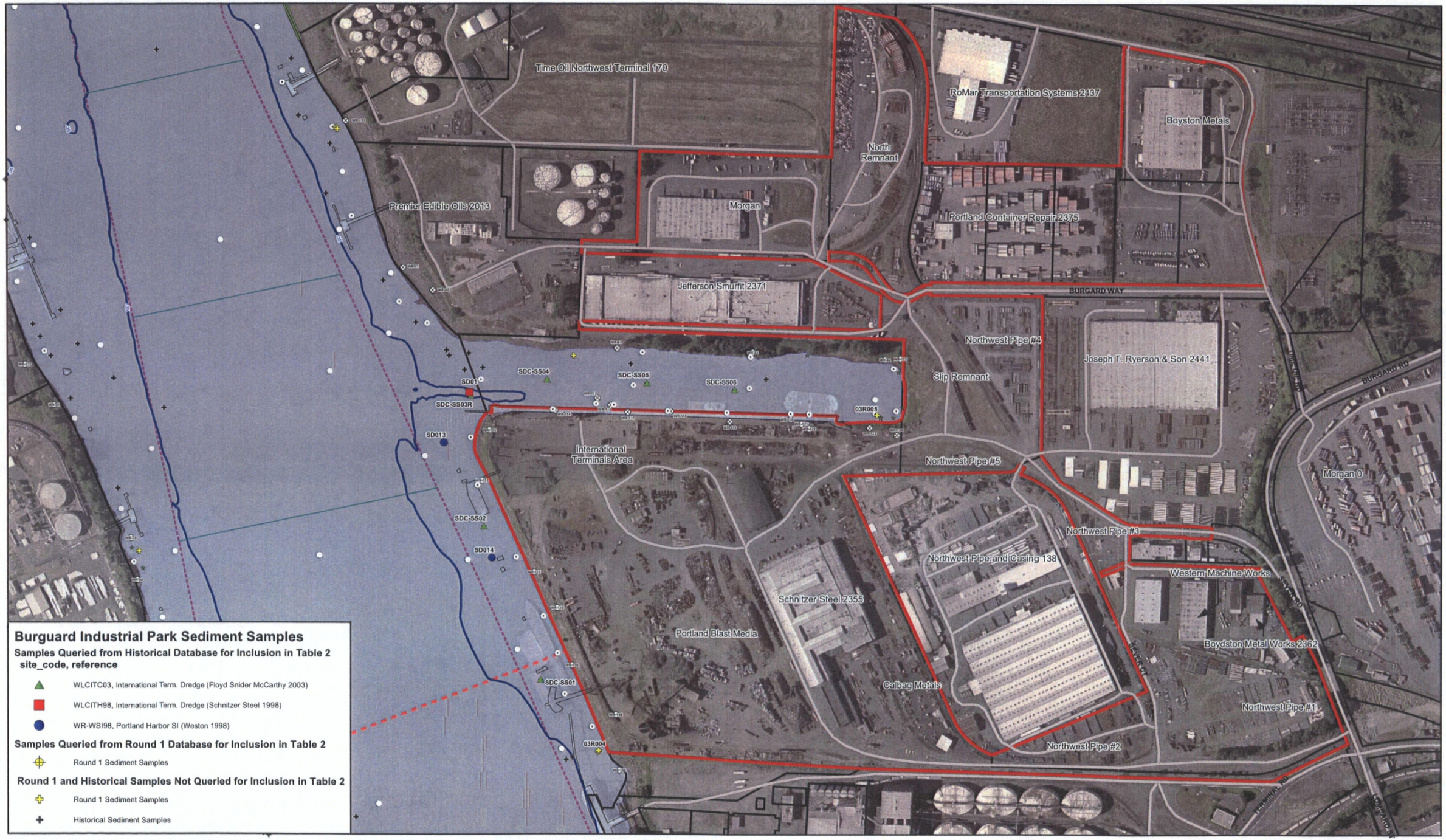
Figure 3-3. Stormwater Runoff System (CH2M HILL 2003b)
Figure 1. Stormwater System Sampling Locations (CH2M HILL 2003b)

FIGURES



Burguard Industrial Park Sediment Samples

Samples Queried from Historical Database for Inclusion in Table 2
site_code, reference

- WLCITC03, International Term. Dredge (Floyd Snider McCarthy 2003)
- WLCITH98, International Term. Dredge (Schnitzer Steel 1998)
- WR-WSI98, Portland Harbor SI (Weston 1998)

Samples Queried from Round 1 Database for Inclusion in Table 2

- Round 1 Sediment Samples

Round 1 and Historical Samples Not Queried for Inclusion in Table 2

- Round 1 Sediment Samples
- Historical Sediment Samples

integral

LWG Lower Willamette Group

Map Document: (C:\GIS\Projects\Portland_Harbor\LWG-Map-Projects\Conseptual_Site_Model\Sample_Locations.mxd)
Plot Date: 03/08/2005

Areal Photo Date: October 2001.
Base Map features from Portland Metro's RLIS.

The City of Portland Outfall mapping information is based on available records; no warranty, expressed or implied, is provided as to the completeness or accuracy of the information. Current layer updated June 2004.

- City Outfalls
- City Outfalls (Abandoned)
- Non-City Outfalls
- Seep Photo Location (Not location of actual Seep)
- Selected ECSI Site Property Boundary
- 35ft. Contour (NAVD 88)
- River Miles
- Docks & In-water Structures
- Navigation Channel

Human Use Areas
- Dockside Worker
- Recreational Beach Use
- Transient

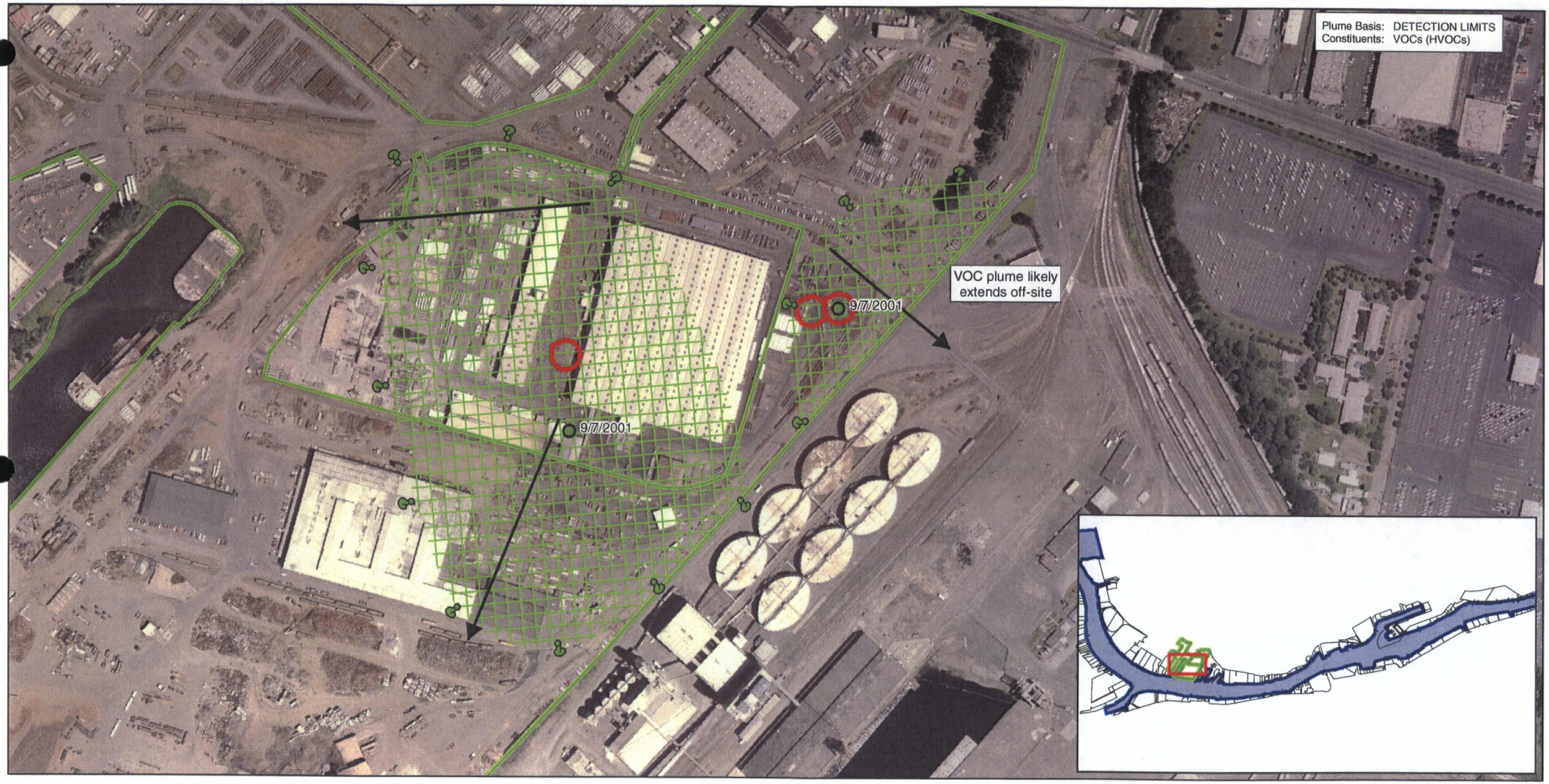
LWG Round 2 Proposed Sediment Samples
- Surface Sample Only
- Core & Surface Sample

0 150 300 600 Feet

DRAFT

DO NOT QUOTE OR CITE. This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Figure 1-Site Features
Portland Harbor RI/FS
Conceptual Site Model
Burgard Industrial Park
ECSI 2355



Groundwater Solutions Inc.

LWG Lower Willamette Group

0 225 450 Feet

FEATURE SOURCES:
Transportation, Water, Property, Zoning or Boundaries: Metro RLIS.
ECSI site locations were summarized in December, 2002 and January, 2003 from ODEQ ECSI files.

Map Creation Date: August 11, 2004

File Name: Fig2_Burgard_NWPipe_SummaryMap.mxd

LEGEND

- Site Boundary
- General Groundwater Flow
- Maximum Detection Location

Contaminant Type

- Petroleum related
- VOCs (HVOC's)

Extent of Impacted Groundwater

For details, refer to plume interpretation table in CSM document.

- Single or isolated detection of COI's. Extent or continuity of impacted groundwater between sample points is uncertain. Color based on contaminant type.
- Estimated extent of impacted groundwater area. Color based on contaminant type.

Figure 2
Portland Harbor RI/FS
Burgard Industrial Park - Northwest Pipe
Upland Groundwater Quality Overview

TABLES

Table 1. Potential Sources and Transport Pathways Assessment

Northwest Pipe Company #138

Table 1. Potential Sources and Transport Pathways Assessment

Last Updated: March 4, 2005

Potential Sources		Media Impacted					COIs																	Potential Complete Pathway				
							TPH			VOCs																		
Description of Potential Source		Surface Soil	Subsurface Soil	Groundwater	Catch Basin Solids	River Sediment	Gasoline-Range	Diesel - Range	Heavier - Range	Petroleum-Related (e.g. BTEX)	VOCs	Chlorinated VOCs	SVOCs	PAHs	Phthalates	Phenolics	Metals	PCBs	Herbicides and Pesticides	Dioxins/Furans	Butyltins	Overland Transport	Groundwater	Direct Discharge - Overwater	Direct Discharge - Storm/Wastewater	Riverbank Erosion
Upland Areas																												
1	Aboveground waste oil tank and ten 55-gallon drums	✓	✓	✓			✓		✓	✓		✓		✓			✓						?			
2	Pipe lining and coating building - northwest corner	✓	✓	✓					?		✓	✓		✓	✓								?			
3	Pipe lining and coating building - southeast corner	✓	✓	✓					?		✓	✓		✓	✓								?			
4	2,000-gallon diesel AST and pumps		✓	✓			✓	✓		✓				✓													
5	Transformer storage	✓			✓				✓			?						✓					?			
6	Sixteen 55-gallon drums of solvent with no containment	✓		✓							✓	✓											?			
7	Industrial well			✓			✓					✓		✓													
8a	1,000-gallon gasoline UST		✓	✓			✓			✓													?			
8b	Bay 9 asphalt dipper tank			?					✓		?	?															
9	Railroad spur	✓		✓					✓					✓									?			
10	Dust suppressant use and storage	?		?					?			?															
11	Transformer area	✓		?					✓			?						✓									
12	Alleged solvent dumping area	✓		✓					✓		✓	✓											?			
13	Alleged petroleum dumping area	✓		?					✓					✓													
14	Onsite catch basin/wash pad and stormwater system				✓				✓		✓	✓		✓												✓	
Overwater Areas																												
	None																											
Other Areas/Other Issues																												
1	Groundwater plume potentially originating from offsite			✓								?											?				

Notes:

All information provided in this table is referenced in the site summaries. If information is not available or inconclusive, a ? may be used, as appropriate. No new information is provided in this table.

ü = Source, COI are present or current or historic pathway is determined to be complete or potentially complete.

? = There is not enough information to determine if source or COI is present or if pathway is complete.

Blank = Source, COI and historic and current pathways have been investigated and shown to be not present or incomplete.

UST	Underground storage tank
AST	Above-ground storage tank
TPH	Total petroleum hydrocarbons
VOCs	Volatile organic compounds
SVOCs	Semivolatile organic compounds
PAHs	Polycyclic aromatic hydrocarbons
BTEX	Benzene, toluene, ethylbenzene, and xylenes
PCBs	Polychlorinated biphenols

SUPPLEMENTAL FIGURES

Figure 3-2. Site Plan (CH2M HILL 2000)
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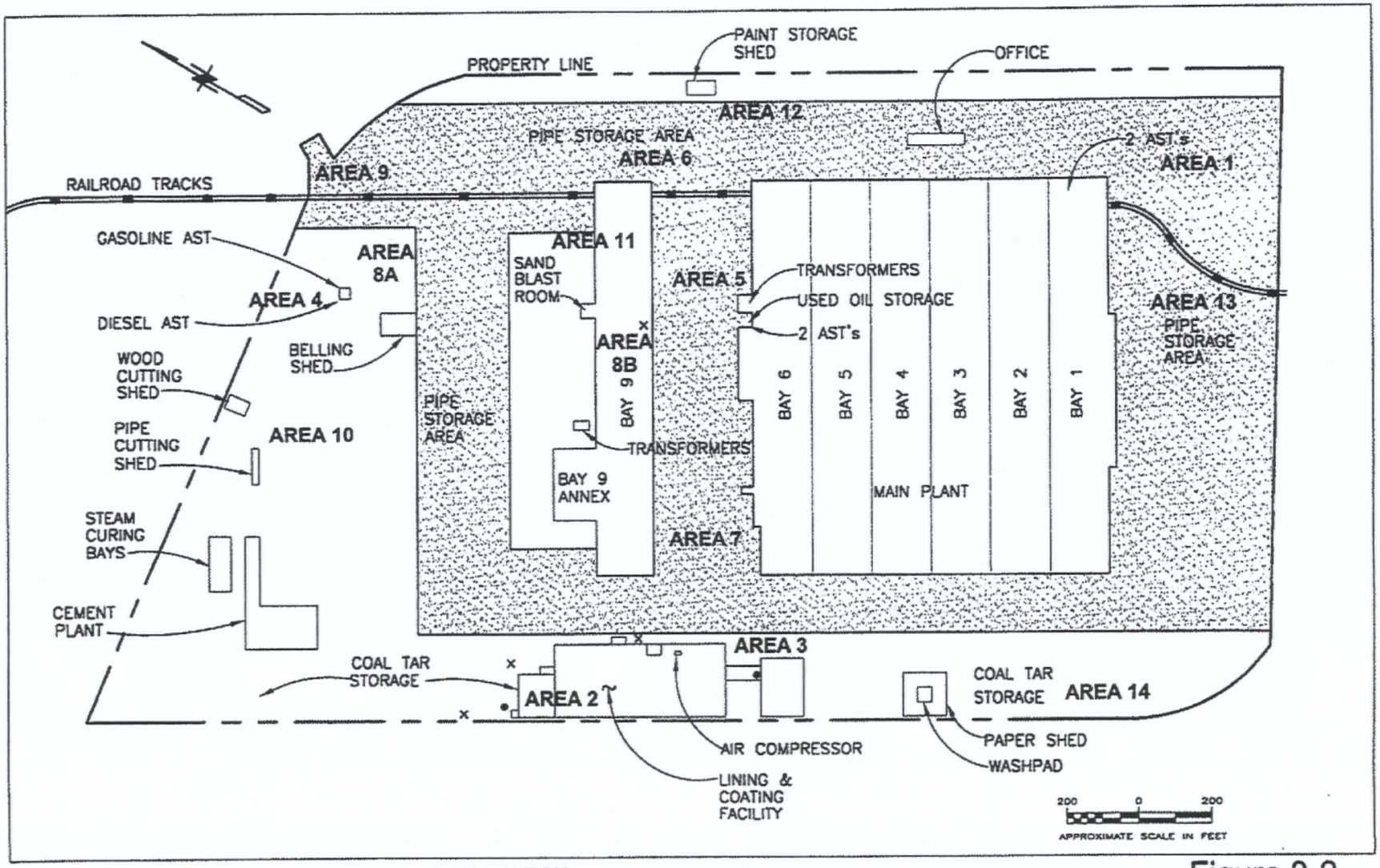
Figure 3-3. Stormwater Runoff System (CH2M HILL 2003b)
Figure 1. Stormwater System Sampling Locations (CH2M HILL 2003b)



EXPLANATION:

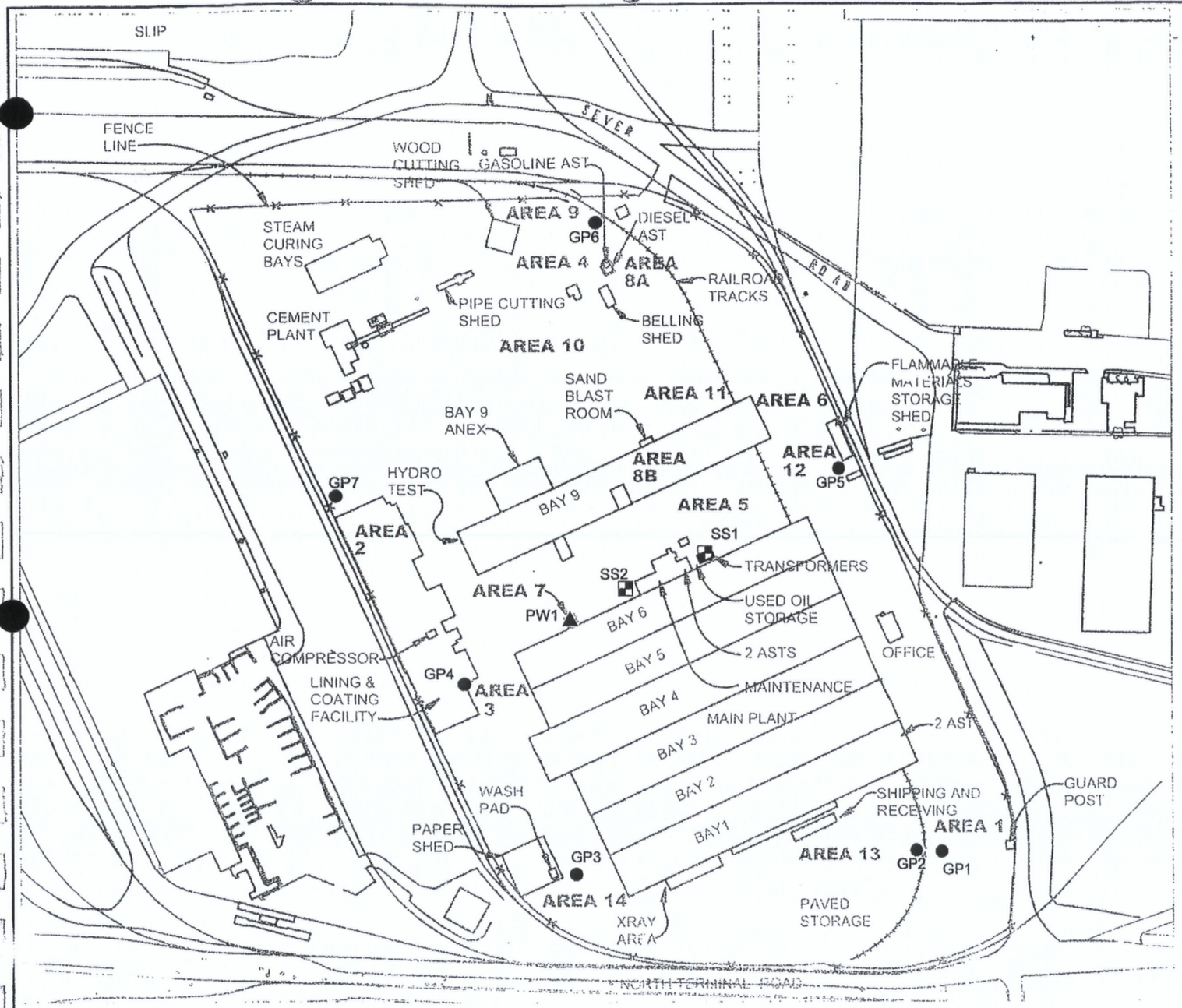
- • SUMP
- × COAL TAR RECLAMATION BLOWERS
- PAVEMENT AREA (APPROXIMATE)

Figure 3-2
Site Plan
NORTHWEST PIPE COMPANY
PORTLAND, OREGEON

CH2MHILL

FIG2.dwg

NOV 2001



LEGEND:

- ● SEPTEMBER 2001 GEOPROBE SAMPLE
- ◪ SEPTEMBER 2001 SURFACE SOIL SAMPLE
- ▲ SEPTEMBER 2001 PRODUCTION WELL SAMPLE

N

0 100 200

SCALE IN FEET

Figure 1

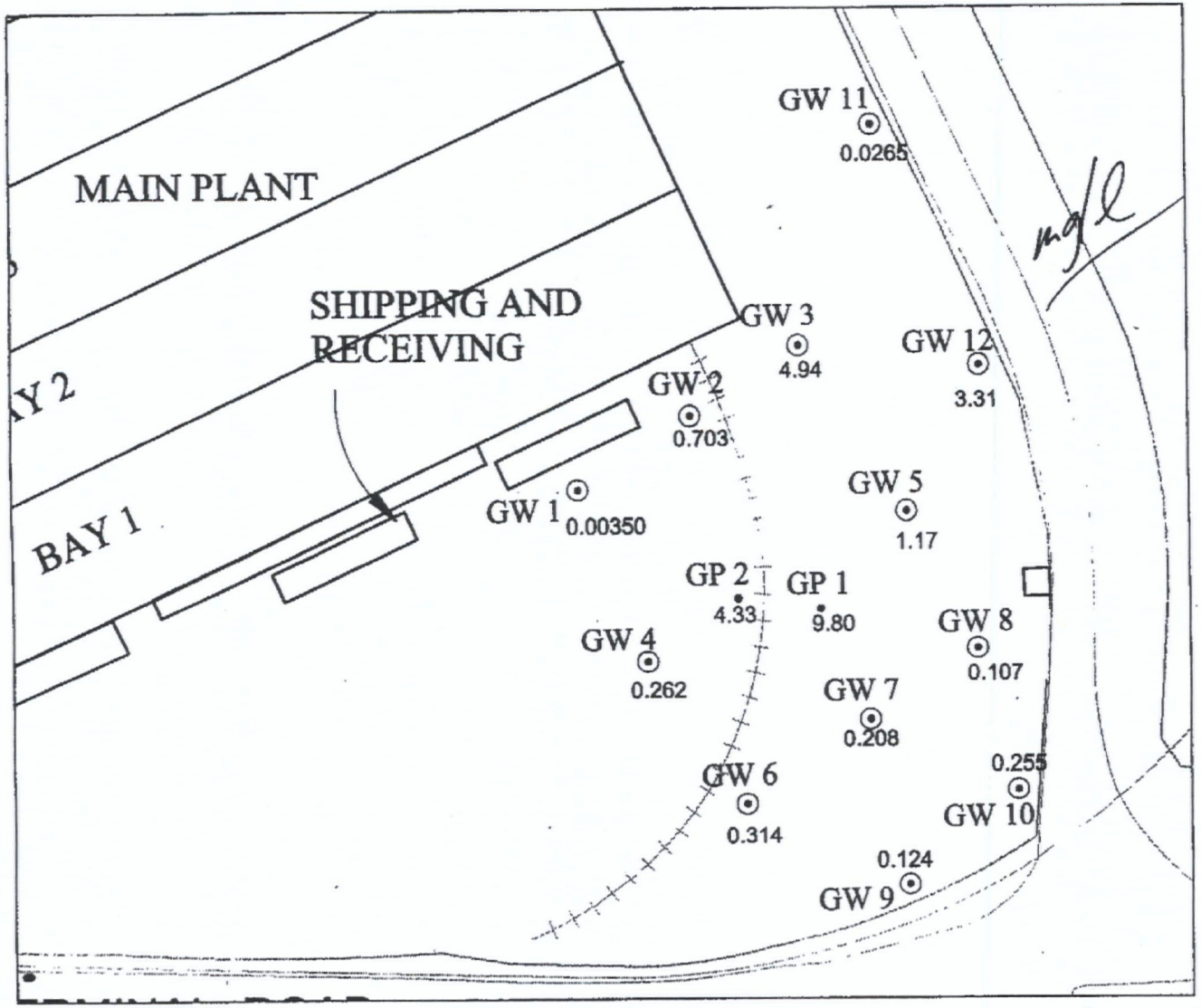
SAMPLE LOCATIONS

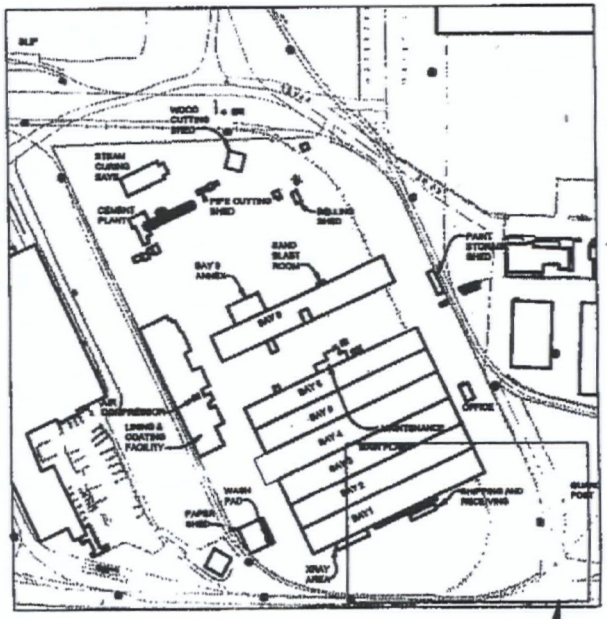
NORTHWEST PIPE COMPANY
PORTLAND, OREGON

CH2MHILL

NWPIPEBASE.DWG

9/26/02





AREA OF DETAIL

LEGEND:

- ⊙ 2002 AUGUST SAMPLING LOCATION
- • SEPTEMBER 2001 GEOPROBE SAMPLE
- 262 TETRACHLOROETHENE CONCENTRATION ug/L

0 30 60
SCALE IN FEET

SC84401.DWG

Figure 1
TETRACHLOROETHENE CONCENTRATIONS
NORTHWEST PIPE COMPANY
PORTLAND, OREGON

CH2MHILL

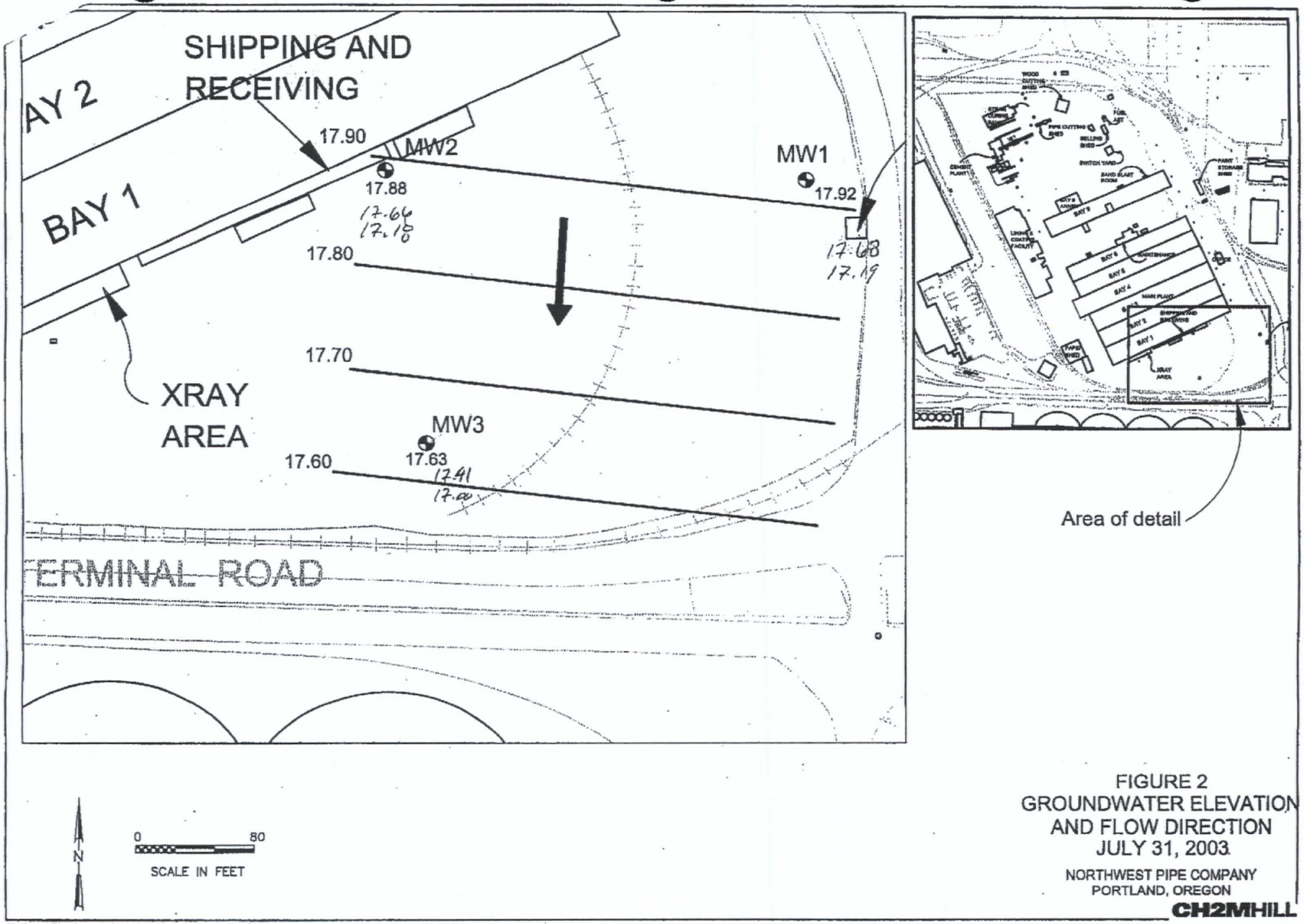


FIGURE 2
GROUNDWATER ELEVATION
AND FLOW DIRECTION
JULY 31, 2003

NORTHWEST PIPE COMPANY
PORTLAND, OREGON

CH2MHILL

Northwest Pipe Company\161844\CAD\Groundwater Flow.DWG

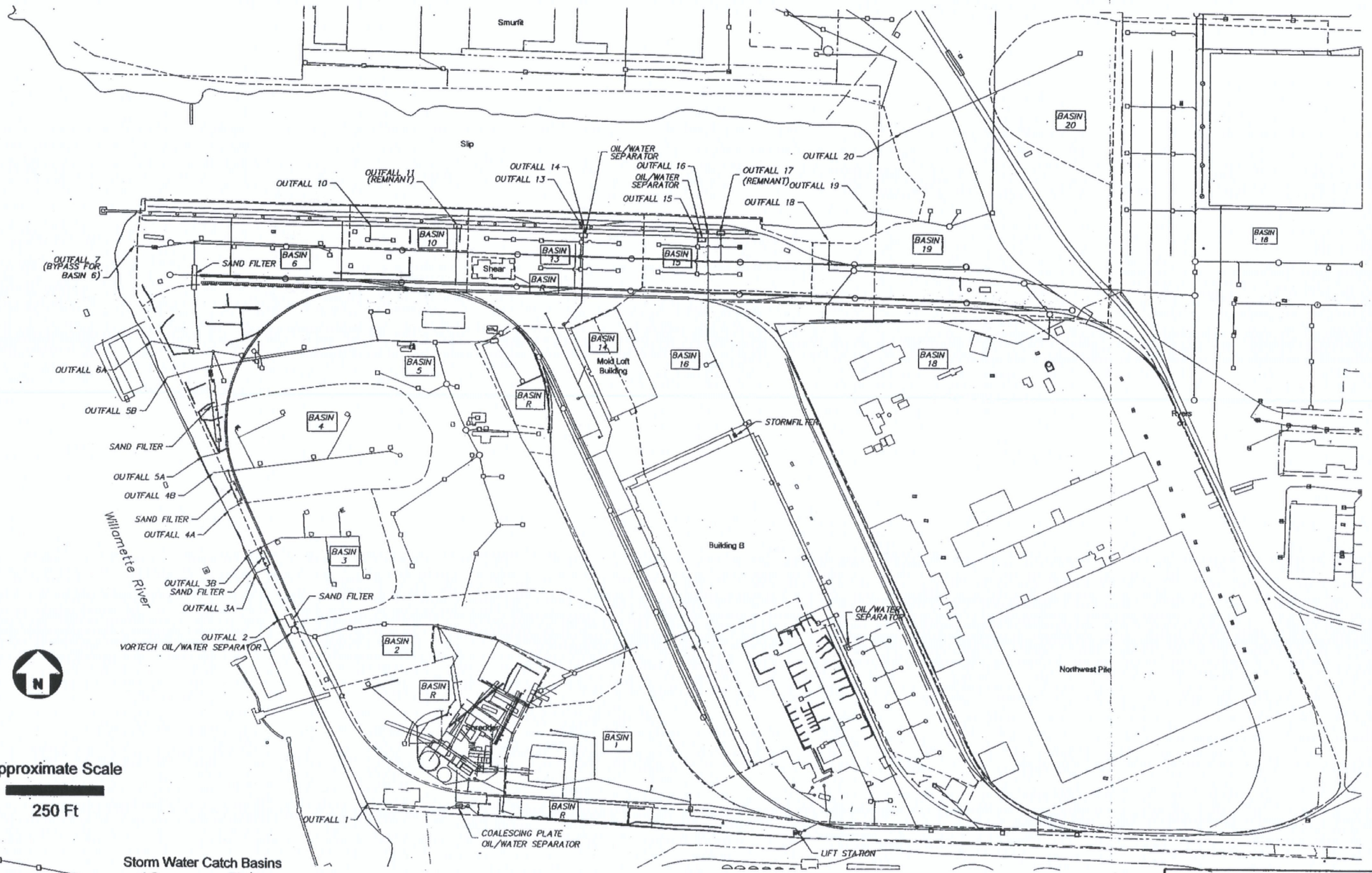
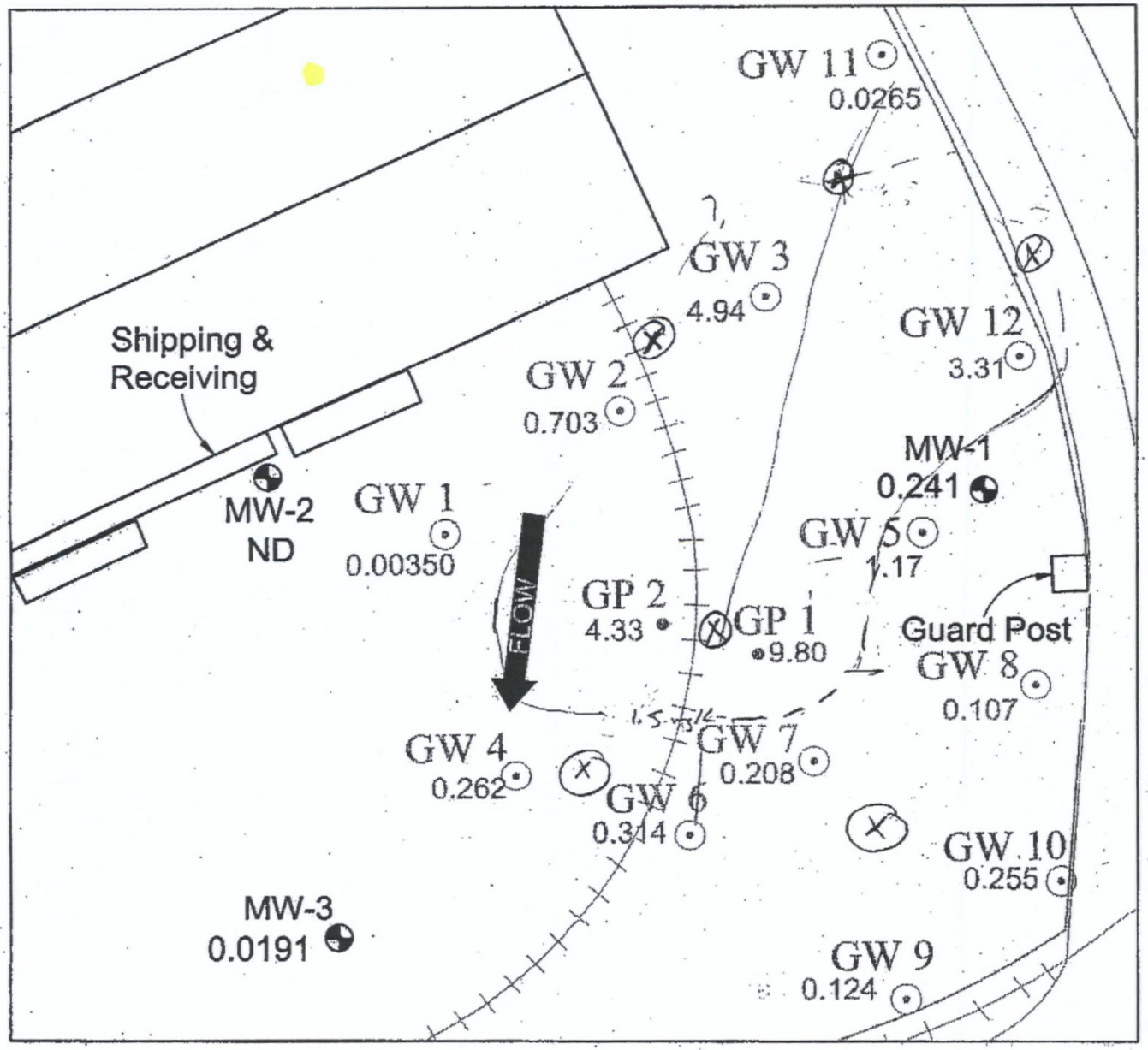
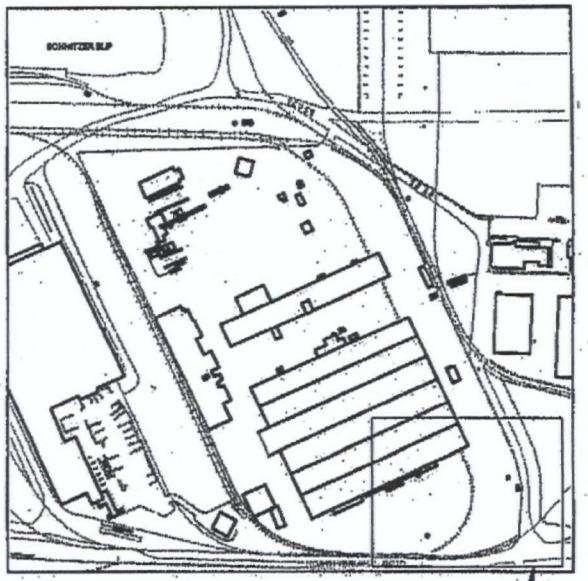


Figure 1-3
Storm Water System
Burgard Industrial Park

BRIDGEWATER GROUP, INC.

12/15/03





LEGEND:

- Monitoring wells sampled August 2003
- 2002 August sampling location
- September 2001 geoprobe sample
- 0.262 Tetrachloroethene concentration mg/L
- ND Not detected at a reporting limit of 0.001 mg/L
- Groundwater flow direction July 31, 2003 (See Fig 2 for groundwater contour)

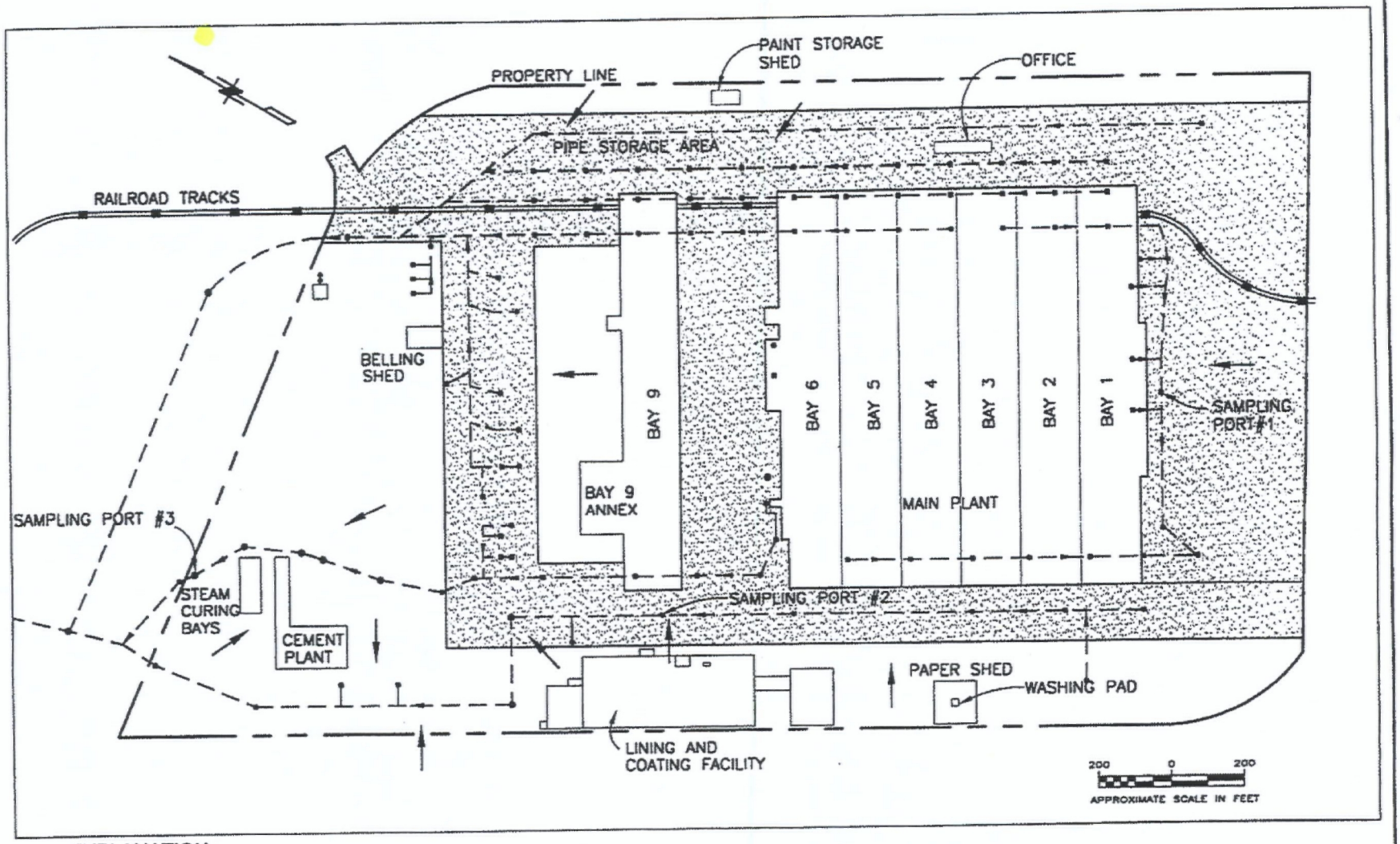
FIGURE 3
PCE CONCENTRATIONS
AND GROUNDWATER FLOW

NORTHWEST PIPE COMPANY
PORTLAND, OREGON

CH2MHILL

Northwest Pipe Comos\n\161844\CAD\167233.DWG

21-Nov-2000



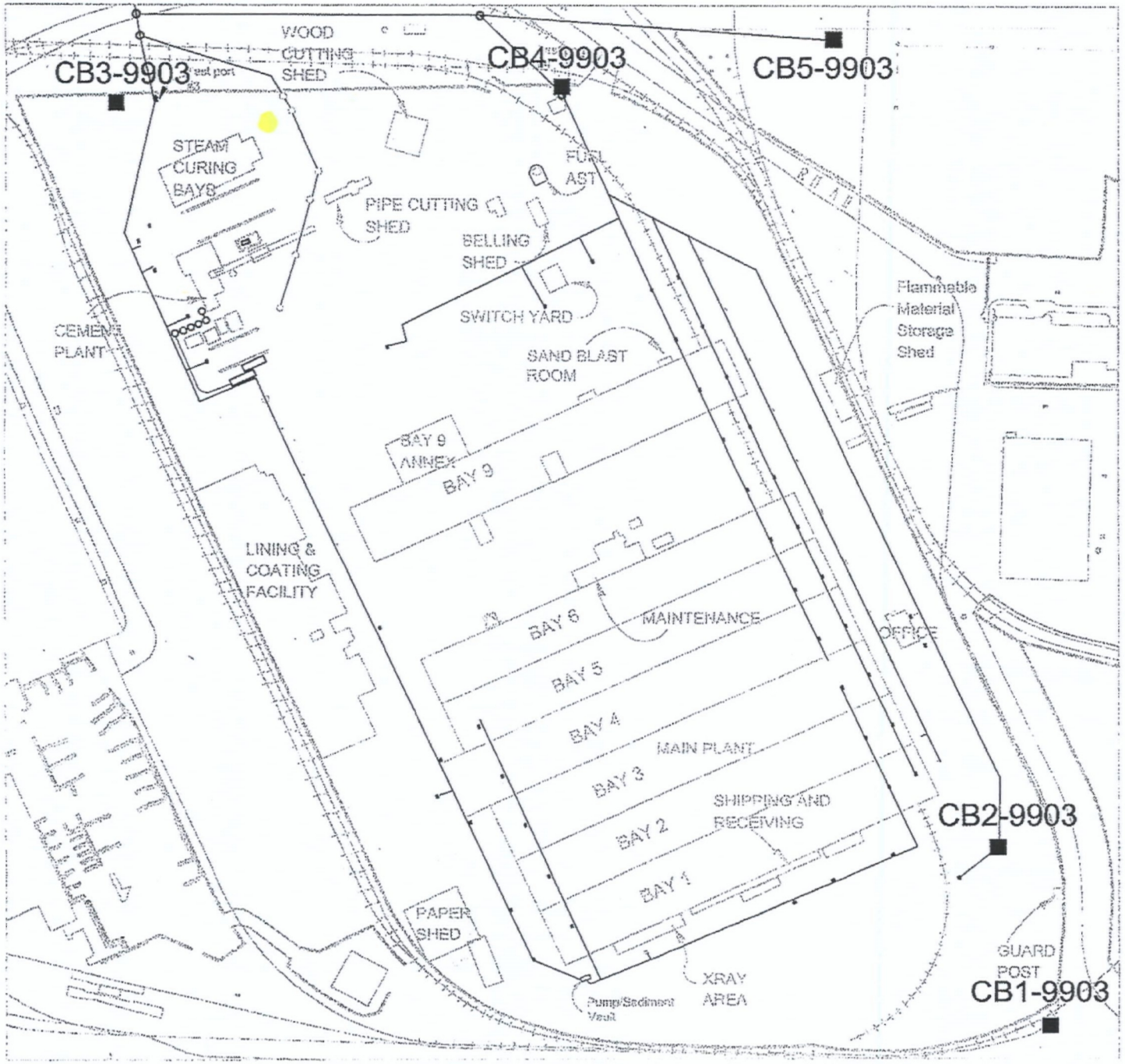
EXPLANATION:

- APPROXIMATE LOCATION OF UNDERGROUND STORM DRAIN PIPING AND FLOW DIRECTION
- SUMP
- WATER SUPPLY WELL
- CATCH BASIN
- MANHOLE
- STORMWATER FLOW DIRECTION
- PAVEMENT AREA (APPROXIMATE)

Figure 3-3
Stormwater Runoff System
NORTHWEST PIPE COMPANY
PORTLAND, OREGON

CH2MHILL

FIG3.dwg



N

0 200

SCALE IN FEET

LEGEND:

■ CATCH BASINS SAMPLED SEPTEMBER 9, 2003

Sample #	Lab #
CB1-9903	C200801
CB2-9903	C200802
CB3-9903	C200803
CB4-9903	C200804
CB5-9903	C200805

FIGURE 1
STORMWATER SYSTEM SAMPLING LOCATIONS

NORTHWEST PIPE COMPANY
PORTLAND, OREGON

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